CLAIMS

What is claimed is:

1	1. A method for performing a frequent itemset operation, the method comprising the
2	steps of:
3	performing the frequent itemset operation in a plurality of phases, wherein each phase
4	is associated with combinations that have a particular number of items;
5	during at least one phase of the plurality of phases, performing the steps of
6	determining candidate combinations that are to be evaluated during the phase;
7	grouping the candidate combinations into clusters based on which items are
8	included in said candidate combinations; and
9	processing said candidate combinations, based on said clusters, to determine
10	whether the candidate combinations satisfy a frequency criteria
11	associated with said frequent itemset operation.
1	2. The method of Claim 1 wherein the step of grouping the candidate combinations into
2	clusters includes the step of establishing an ordering for said candidate combinations by
3	sorting the candidate combinations relative to each other based on the items within each of
4	the candidate combinations.
1	3. The method of Claim 2 wherein the step of processing the candidate combinations
2	based on the clusters includes processing the candidate combinations in a sequence based on
3	said ordering.
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1	4. The method of Claim 1 wherein the step of grouping the candidate combinations into
2	clusters includes hashing the candidate combinations into buckets based on the items that the
3	candidate combination contain.

1	5. The method of Claim 1 wherein the step of processing the candidate combinations
2	includes generating bitmaps for the candidate combinations, and determining how many item
3	groups of an item group population include each candidate combination based on the bitmap
4	for the candidate combination.
1	6. The method of Claim 5 wherein the step of processing the candidate combinations
2	includes, for each cluster, performing the steps of:
3	generating a bitmap for a particular combination that is a subcombination of all
4	combinations in the cluster;
5	using the bitmap for the particular combination to generate bitmaps for all
6	combinations in the cluster;
7	using the bitmap generated for each combination in the cluster to determine how
8	many item groups include the combination; and
9	after all combinations in the cluster have been processed, discarding from volatile
10	memory the bitmap for the particular combination.
1	7. The method of Claim 1 wherein the step of processing the candidate combinations
2	includes generating bitmaps for the candidate combinations as the candidate combinations
3	are processed in a sequence, the method further comprising the steps of:
4	generating one or more intermediary bitmaps for use in generating of a bitmap for a
5	current candidate combination; and
6	after generating the bitmap for the current candidate combination, retaining in volatile
7	memory only those intermediary bitmaps that are base bitmaps of a next
R	candidate combination in said sequence; and

9	if any intermediate bitmaps are retained, then using one or more of the intermediary
10	bitmaps to generate a bitmap for the next candidate combination in said
11	sequence.
1	8. A method for performing a frequent itemset operation, the method comprising the
2	steps of:
3	performing the frequent itemset operation in a plurality of phases, wherein each phase
4	is associated with combinations that have a particular number of items;
5	during at least one phase of the plurality of phases, performing the steps of
6	determining candidate combinations that are to be evaluated during the phase;
7	processing said candidate combinations to determine whether the candidate
8	combinations satisfy a frequency criteria associated with said frequent
9	itemset operation, wherein the step of processing the candidate
10	combinations includes generating bitmaps for the candidate
11	combinations; and
12	using an index on non-volatile memory to store a set of bitmaps that are
13	generated during said at least one phase; and
14	during a subsequent phase of said plurality of phases, performing the steps of
15	retrieving bitmaps from said index into volatile memory; and
16	using the bitmaps retrieved from said index to generate bitmaps for candidate
17	combinations of said subsequent phase.
1	9. The method of Claim 8 wherein the step of using an index on non-volatile memory to
2	store a set of bitmaps includes using an index that uses the combination associated with a
3	bitmap as an index key for determining where within the index to place an entry for the
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- 1 10. The method of Claim 8 wherein:
- 2 the at least one phase is a phase associated with N-item combinations; and
- 3 the set of bitmaps includes bitmaps associated with all N-item combinations that
- 4 satisfy the frequency criteria.
- 1 11. A computer-readable medium carrying one or more sequences of instructions which,
- 2 when executed by one or more processors, causes the one or more processors to perform the
- 3 method recited in Claim 1.
- 1 12. A computer-readable medium carrying one or more sequences of instructions which,
- 2 when executed by one or more processors, causes the one or more processors to perform the
- 3 method recited in Claim 2.
- 1 13. A computer-readable medium carrying one or more sequences of instructions which,
- 2 when executed by one or more processors, causes the one or more processors to perform the
- 3 method recited in Claim 3.
- 1 14. A computer-readable medium carrying one or more sequences of instructions which,
- 2 when executed by one or more processors, causes the one or more processors to perform the
- 3 method recited in Claim 4.
- 1 15. A computer-readable medium carrying one or more sequences of instructions which,
- 2 when executed by one or more processors, causes the one or more processors to perform the
- 3 method recited in Claim 5.
- 1 16. A computer-readable medium carrying one or more sequences of instructions which,
- 2 when executed by one or more processors, causes the one or more processors to perform the
- 3 method recited in Claim 6.

- 1 17. A computer-readable medium carrying one or more sequences of instructions which,
- 2 when executed by one or more processors, causes the one or more processors to perform the
- 3 method recited in Claim 7.
- 1 18. A computer-readable medium carrying one or more sequences of instructions which,
- 2 when executed by one or more processors, causes the one or more processors to perform the
- 3 method recited in Claim 8.
- 1 19. A computer-readable medium carrying one or more sequences of instructions which,
- 2 when executed by one or more processors, causes the one or more processors to perform the
- 3 method recited in Claim 9.
- 1 20. A computer-readable medium carrying one or more sequences of instructions which,
- 2 when executed by one or more processors, causes the one or more processors to perform the
- 3 method recited in Claim 10.